

# Tissue-equivalent Phantoms by Phantom Specialist QRM: Accuracy And Efficiency in Image Performance Testing

Phantoms are used to evaluate radiation doses and attenuations within the human body. They play an important role in quality control and performance testing of radiation equipment used in imaging and therapeutic applications. Homogeneous phantoms with various shapes and features made from tissue-equivalent materials can simulate tissue characteristics, allowing medical physicists to assess the actual dose in tissues.

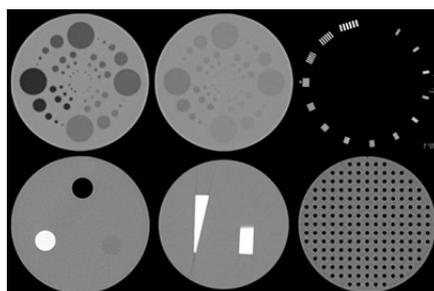


The Cone-Beam Phantom by QRM, a PTW company since 2020, helps medical physicists evaluate the image performance of computed tomography (CT) and Cone-Beam CT accurately and efficiently as required by national and international imaging protocols or vendor-specific guidelines. Its tissue-equivalent phantom body contains different sections, allowing the acquisition of all relevant image quality parameters with one single phantom. Performance parameters include in-plane spatial resolution; modulation transfer function (MTF) in different orientations; low-contrast resolution; contrast-to-noise ratio; in-plane geometrical accuracy; image homogeneity/noise; and CT number linearity (scaling). The CBCT Phantom is available in two models, Basic and Expert. Both models share the same 20 mm thick sections and can perform the same tests, but the Expert model is equipped with an enhanced low-contrast section.

With its compact, lightweight body, the solid phantom can be easily installed for testing, which makes it suitable for use in 3D dental, C-arm, or flat detector VCT devices. Phantom setup is quick and intuitive: the phantom is placed on the patient

couch and its position aligned using the in-room lasers.

## Multiple sections for a comprehensive evaluation of image performance



The first section of the phantom consists of negative contrast steps to the background, altering between -3 HU to -200 HU with variable diameter. The precisely manufactured spatial resolution section of the Expert model, which is made up of 14 circularly aligned line patterns, enables measurements of in-plane resolution varying from 4 to 30 lp/cm. The third section comprises three cylindrical inserts of 24 cm in diameter, each made of bone- and water-equivalent material and air, enabling medical physicists to scale CT numbers and measure noise. Two perpendicularly aligned PTFE edges allow evaluation of the edge response of the CT scanner in terms of MTF (Modulation Transfer Function). An additional section has been designed for geometric accuracy checks, containing 177 holes, each of 3

mm in diameter, which are accurately aligned both vertically and horizontally. Both basic and expert phantom models have a plain section for measuring noise and homogeneity.

## Commercial and customised phantoms for a wide range of applications

QRM is an expert in the development of imaging and therapy phantoms, which are made of soft tissue-, bone- and water-equivalent materials, solid resins, or PMMA. Apart from a wide range of commercially available phantoms, the company's core competence is in customised phantoms for specific user testing needs. With more than 25 years of experience in phantom development and research, QRM is a renowned specialist for implementing individual solutions, managing all aspects of the process – from phantom specification and design to production and final acceptance testing at QRM facilities. Since April 2020, PTW has held a majority share in QRM.

For more information about QRM phantoms and custom solutions, visit [www.qrm.de](http://www.qrm.de).



In this role, she is responsible for developing dosimetry and QA solutions for diagnostic radiology.

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